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REDESCRIPTION OF *NEPHTYS SQUAMOSA* EHLERS (POLYCHAETA: NEPHTYIDAE)

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Abstract.—Confusion about the identity of *Nephtys squamosa* Ehlers, 1887 requires redescription of the species based on the syntypes. A lectotype is designated. Comparisons are made with similar species.

Nephtys squamosa was originally described by Ehlers (1887) as having scale-like structures on both dorsum and ventrum, a character unique to the family Nephtyidae. Many subsequent authors have described *N. squamosa* on the basis of specimens from temperate and tropical waters of the Atlantic and the East Pacific (Augener 1918; Monro 1933; Fauvel 1936; Hartman 1940, 1950; Pettibone 1963; Nonato & Luna 1970; Fauchald 1972, 1976; Gardiner 1976; Taylor 1984; Lana 1986). Although all agree on the presence of the scale-like lamellae, discrepancies exist among descriptions in the parapodial morphology. None of these descriptions after that of Augener (1918) mentioned the presence of infrapreacicular lamellae on neuropodia, which is clearly stated in the original description (Ehlers 1887).

Types of *N. squamosa* have been examined in the present study to clarify its identity. The presence of infrapreacicular lamellae has been confirmed on neuropodia, and suprapreacicular lamellae have been also found on notopodia. The present examination has further shown the presence of tiny, slender dorsal cirri on the first notopodia, overlooked by previous workers.

Nephtys squamosa Ehlers, 1887
Figs. 1–3

Nephthys squamosa Ehlers, 1887:128–131, pl. 37, figs. 7–10.

Material examined.—Original specimens collected from Florida during the U.S. Coast Survey 1868–1869, L. F. Pourtales, assist.: off French Reef, Cast No. 6, 103 fms, 3 Apr 1869, paralectotype (MCZ 735).—off French Reef, Cast No. 4, 50 fms, 3 Apr 1869, paralectotype (MCZ 740).—off Alligator Reef, Cast No. 9, 113 fms, 8 May 1869, paralectotype (MCZ 836).—off American Shoal, 55 fms, lectotype (MCZ 1202).

Measurements.—Lectotype complete, 48.4 mm long, 3.4 mm wide including parapodia with 120 setigers. Paralectotypes (MCZ 735, 740, 836) incomplete posteriorly, respectively, 21.7 mm long, 3.5 mm wide with 47 setigers, 54.4 mm long, 2.9 mm wide with 105 setigers, 30.7 mm long, 2.4 mm wide with 96 setigers.

Description.—Body creamy white to brown, lacking pigmentation in alcohol. Eyes absent.

Prostomium pentagonal with anterior margin convex, thin, spatulate (Fig. 1a, b); lateral margins rounded, broadest between second antennae (Fig. 2a), posterior margin with V-shaped middorsal projection extending to posterior border of setiger 1. Anterior part between first antennae translucent, marked by an intricate pattern of opaque tissue (Figs. 1b, 2a). First antennae small, flattened, attached obliquely, appearing as raised lobes originating some distance from and fused with frontal prostomial margin (Figs. 1b, 2a). Second antennae large, basally flattened and distally conical, slightly constricted at bases, much larger than 1st antennae, directed laterally at middle of ventral surface of prostomium, well

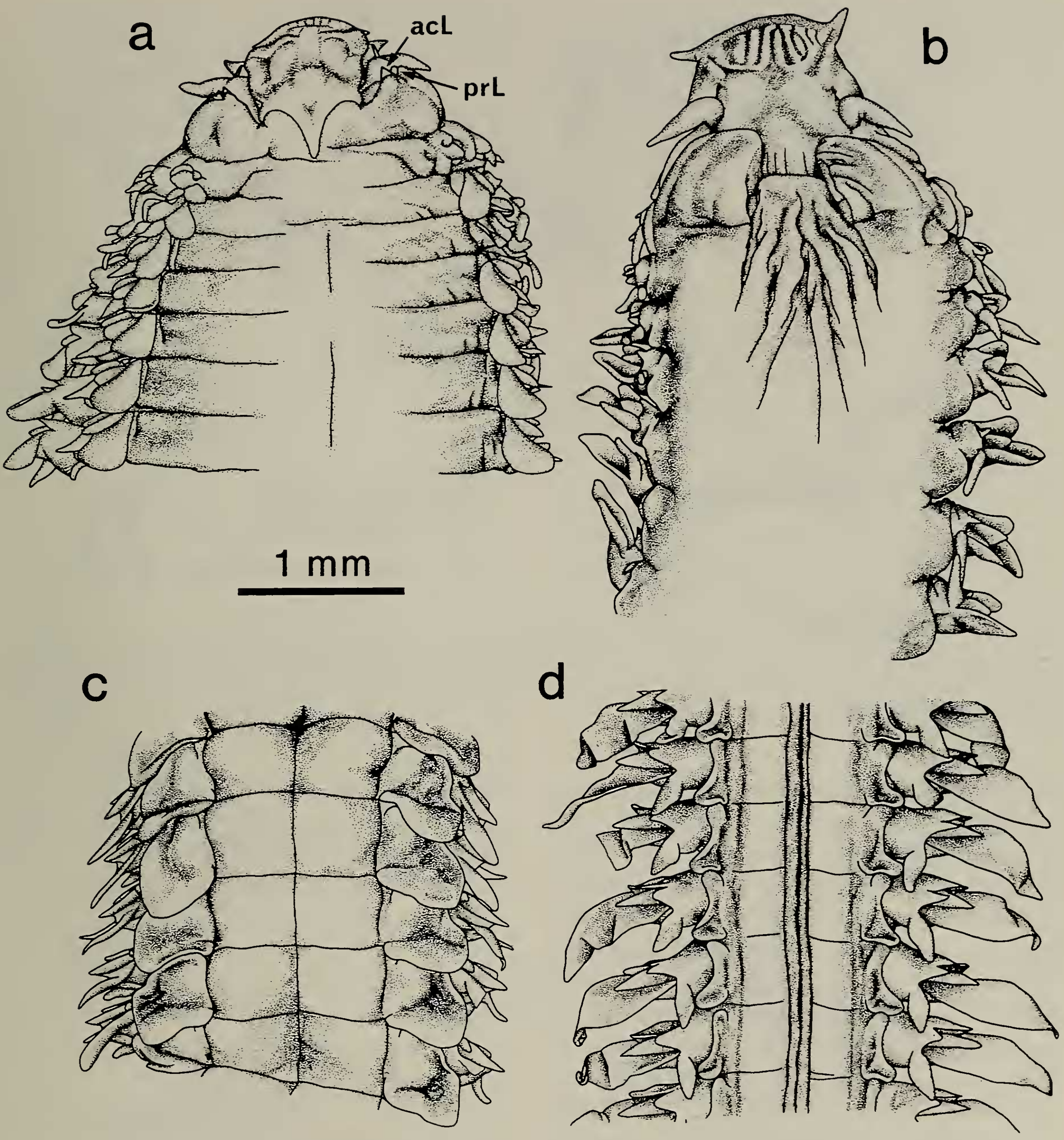

Fig. 1. *Nephtys squamosa* (setae omitted): a, c, d, lectotype (MCZ 1202), b, paralectotype (MCZ 735): a, Anterior end, dorsal view, ventrally dissected and somewhat flattened, dorsal cirrus missing and preacicular lobe twisted outside on 1st right notopodium (acL–acicular lobe; prL–preacicular lobe); b, Same, ventral view, 3rd right ventral cirrus missing (notopodia omitted); c, 72nd to 76th setiger, dorsal view (neuropodia omitted); d, 74th to 78th setiger, ventral view (notopodia omitted).

behind 1st antennae and slightly anterior to 1st neuropodia (Figs. 1a, b; 2a, b). Mouth covered with two thick lateral lips and thick rugose midventral lip at level of setiger 1 (Fig. 1b); rugose area extending to setiger 5.

Setiger 1 modified (Figs. 1a, 2b); notopodia reduced, with triangularly pointed acicular lobes, short preacicular and postacicular lobes (preacicular lobes concealed behind acicular lobes and usually not recognizable from above); dorsal cirri (barely visible unless stained) tiny, slender, point-

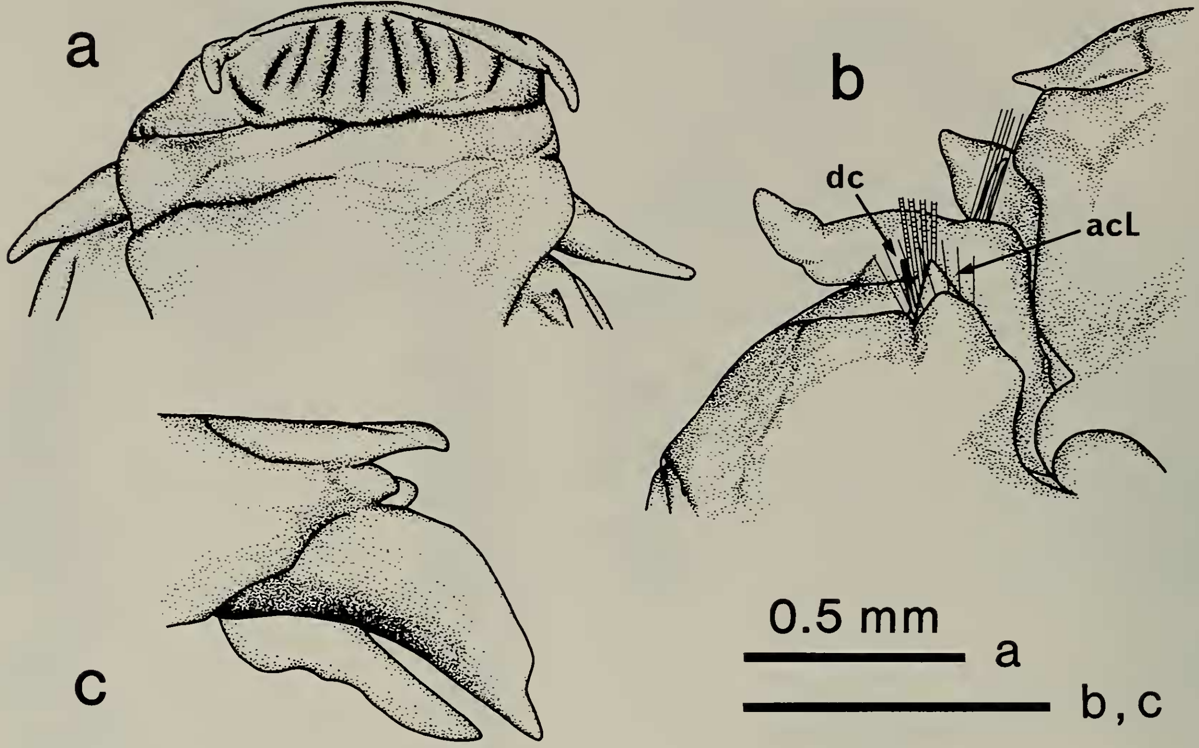

Fig. 2. *Nephtys squamosa*: a, c, paralectotype (MCZ 735), b, lectotype (MCZ 1202): a, Anterior half of prostomium, dorsal view (setae omitted); b, 1st left parapodium, dorsal view, preacicular lobe obscured by acicular lobe (acL–acicular lobe; dc–dorsal cirrus; tips of setae omitted); c, 12th right neuropodium, dorsal view (setae omitted).

ed, arising from outer side of acicular lobes near their base between preacicular and postacicular setal fascicles (Fig. 2b). Neuropodia of setiger 1 on anterior margin, lateral to prostomium, with slender rudimentary acicular lobes projecting anteriorly (Figs. 1a, 2b); acicular lobes supported by thin acicula whose tip curves inward. Ventral cirri large, similar to or smaller than 2nd antennae, digitate but tips may be conical, lateral to neuropodia and continuous with anterior setigerous margins, directed laterally or bent backward (Figs. 1a, 2b). Notosetae of setiger 1 including preacicular barred (laddered) capillaries and very finely serrated slender postacicular capillaries; neurosetae long, thin, smooth capillaries, surrounding acicular lobes (Fig. 2b).

Parapodia similar throughout from setiger 2; both rami with preacicular and postacicular setal fascicles; branchiae (interramal cirri) may be lacking on setiger 2. Both notopodial and neuropodial acicular lobes conical (Fig. 3a–c), becoming acutely conical and pointed posteriorly (Fig. 3e). Notopodial presetal lamellae thin, rather broad and slightly bilobed, distally rounded, extending from lower margins of notopodia, as long as acicular lobes on anterior parapodia (Fig. 3a–c), posteriorly reduced and much shorter than acicular lobes (Fig. 3e). Small lamellae dorsal to notopodial presetal lobes, thinner than presetal lobes except on middle parapodia, rounded on anterior notopodia (Fig. 3a, b), posteriorly reduced and becoming much thinner and smaller (Fig. 3c, e), barely recognizable on posterior setigers (Fig. 3e). Preacicular setae appearing mostly beyond dorsal margins of presetal lamellae and usually partially covering small suprapreacicular lamellae (Fig. 3a–c, e). Neuropodial presetal lamellae thin, larger than notopodial presetal lamellae, extending from upper margins of neuropodia rather triangularly on middle parapodia (Fig. 3b, c), distally rounded on all but especially on anterior and posterior parapodia (Fig. 3a, e), as long as acicular lobes on anterior

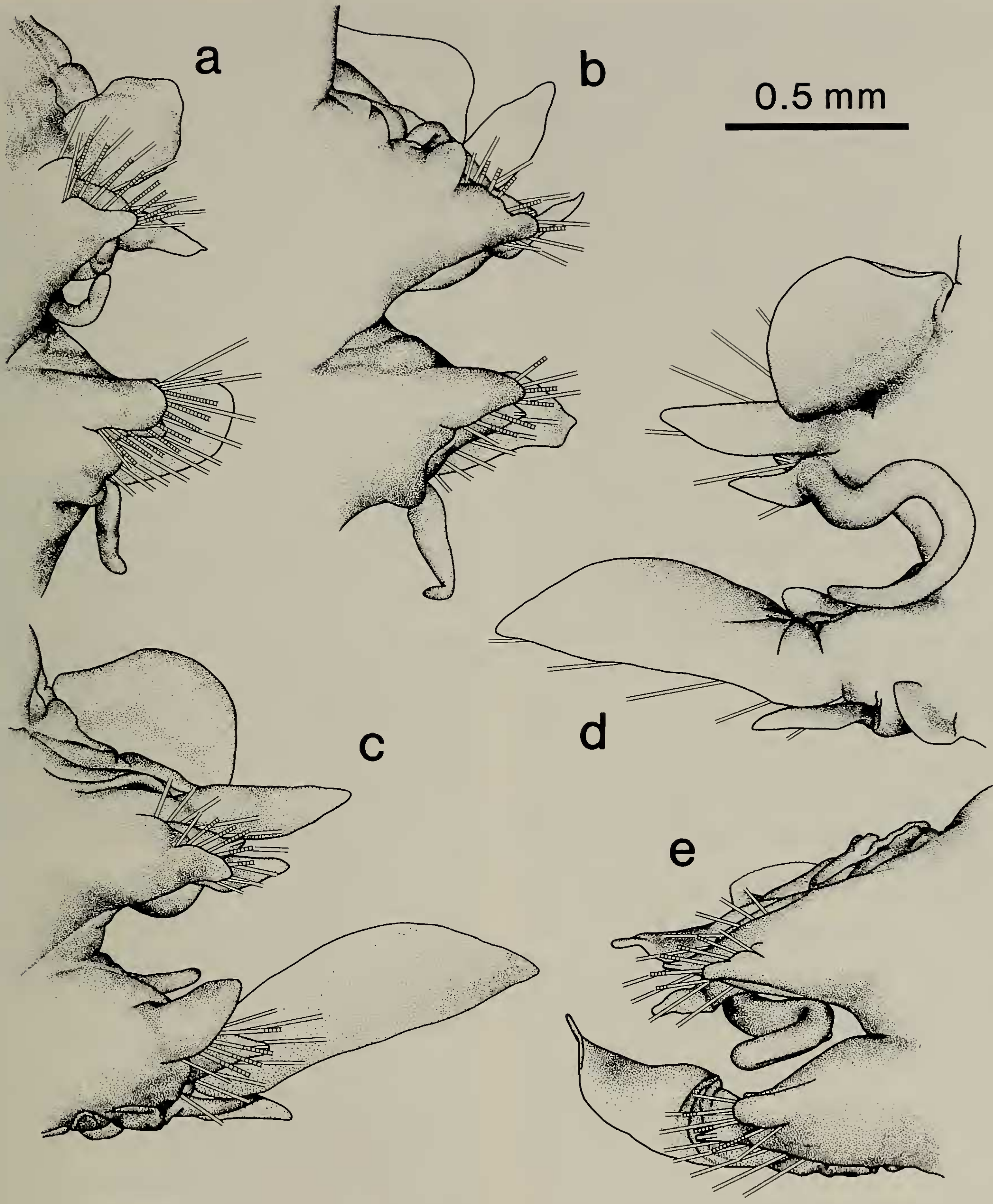

Fig. 3. *Nephtys squamosa* (tips of setae omitted): a, b, paralectotype (MCZ 735), c–e, lectotype (MCZ 1202): a, Left parapodium, setiger 6, anterior view; b, Same, setiger 32, anterior view; c, Same, setiger 40, anterior view; d, Same, posterior view (preacicular setae omitted); e, Right parapodium, setiger 79, anterior view.

neuropodia (Fig. 3a, b), posteriorly reduced and much shorter than acicular lobes (Fig. 3e). Lamellae ventral to neuropodial presetal lobes, broad, thin, shorter than presetal lobes, slightly bilobed on anterior parapodia (Fig. 3a, b), posteriorly reduced and becoming narrower and much thinner, thinner than presetal lobes, hardly recognizable on posterior setigers (Fig. 3e). Preacicular setae appearing mainly beyond ventral margins of presetal lamellae and usually partially covering infrapreacicular lamellae (Fig. 3a–c, e). Notopodial postsetal lamellae thin, ligulate, extending dorsolaterally from segmental wall above and longer than acicular lobes, distally rather rounded on anterior setigers (Fig. 3a), posteriorly becoming more or less pointed (Fig. 3b–e). Neuropodial postsetal lamellae large, thin, extending from behind and longer than acicular lobes (Fig. 3a–e), posteriorly extending much further (Fig. 3c, e), but degree of extension variable between specimens (Fig. 3b, c), with rather pointed tips except on anterior parapodia where distally rounded (Fig. 3a). Small, short lobe on superior edge of neuropodia between presetal and postsetal lamellae (Figs. 2c, 3a, d, e) except on setiger 1, distinct on anterior neuropodia but posteriorly reduced and barely recognizable. Dorsal cirri flattened, thin, triangularly elongate with rather pointed tips, smaller than notopodial postsetal lamellae, extending laterally from basal part of branchiae behind acicular lobes (Fig. 3a–e). Ventral cirri digitiform on anterior several parapodia (Figs. 1b, 3a), thereafter foliaceous, constricted at bases (Figs. 1b, 3b–d).

Branchiae first present on setigers 2–3 usually as processes slightly curved outward, completely recurved within a few setigers (Fig. 3a), thereafter gradually increasing in size and fully developed by setigers 25–27 (Fig. 3c–e), then (in lectotype) decreasing gradually in size after setigers 89–92, and not recurved after setigers 106–107, still present as very small rudimentary ridge on setiger 116, completely absent on last 4 setigers.

Scale-like dorsal lamellae broad, foliaceous (Fig. 1c), originating from dorsolateral wall of body (Fig. 3b–e), extending mainly posterolaterally over notopodia, partially overlapping successive segments in shingle-like arrangement (Fig. 1c), beginning on setigers 5–9, becoming larger more posteriorly but not fully developed until middle setigers (Fig. 3c, d), gradually decreasing in size (in lectotype) over posterior several setigers but still recognizable on setiger 117, absent on last 3 setigers. Similar but much smaller lamellae present on ventrolateral surface of body (Figs. 1d, 3c, d), foliaceous, extending somewhat posterolaterally, only slightly covering neuropodia and successive segments (Fig. 1d), beginning on setiger 2, increasing in size more posteriorly but not fully developed until middle setigers (Fig. 3c, d), gradually reduced (in lectotype) over posterior several setigers but still recognizable on setiger 117, absent on last 3 setigers.

Both preacicular and postacicular setae occurring in spreading fascicles, with postacicular fascicles wider than preacicular ones (Fig. 3a–c, e); preacicular setae much shorter and fewer than postacicular setae. Most preacicular setae consisting of barred capillaries; a few, similarly long, very finely serrated capillaries at upper and lower end of preacicular fascicles. Postacicular setae consisting of finely serrated long capillaries. No lyrate seta found. Acicula single in rami, completely embedded in conical acicular lobes (Fig. 3b–e).

Proboscis not everted in specimens examined. Proboscis in lectotype previously dissected, damaged, incomplete, with terminal circlet of 20 bifid papillae and simple middorsal papilla, with at least 20 rows of 5–6 cirriform papillae subterminally, and more distal cirriform middorsal papilla; middorsal papilla not noticeably larger nor longer than others. Pair of horny jaws present inside proboscis. Pharyngeal trepans absent.

Remarks.—In the original description, Ehlers (1887:130) stated that dorsal cirri were about half as long as notopodial postsetal lamellae. This is the case in the middle parapodia of the lectotype (Fig. 3c, d). In two paralectotypes (MCZ 735, 836), however, notopodial postsetal lamellae do not extend beyond dorsal cirri (Fig. 3a, b). The relative length of notopodial postsetal lamellae to dorsal cirri is thought to vary greatly between specimens.

There are obvious problems with descriptions of *Nephtys squamosa.* Although the presence of suprapreacicular lamellae on notopodia has been clearly recognized in the lectotype and paralectotypes in the present study, neither the original description (Ehlers 1887) nor any subsequent description mentioned this structure, whereas Ehlers described infrapreacicular lamellae on neuropodia (p. 130, Taf. 37, fig. 8). Examination of the lectotype and paralectotypes also revealed some other structures such as tiny, slender dorsal cirri on 1st notopodia and small, short lobes on the superior edge of neuropodia between presetal and postsetal lamellae, which had been overlooked by previous workers.

Descriptions subsequent to Augener (1918) did not mention the presence of infrapreacicular lamellae on neuropodia. Hartman's figure (1940: pl. 41, fig. 98) of the 25th parapodium of *N. squamosa* from the Gulf of California showed only preacicular lamellae both on the notopodium and the neuropodium, and she stated (p. 237) that the prostomium of her specimens differed from that originally described for the species. Neither is an additional preacicular lamella shown on either the notopodium or the neuropodium in Taylor's figure (1984: fig. 35-8b) of the 20th parapodium of *N. squamosa* from the Gulf of Mexico. Taylor also stated (p. 11) that dorsal cirri were lacking on the 1st notopodia of his specimens, whereas dorsal cirri, although tiny and slender, are present on 1st notopodia of the lectotype and paralectotypes. Additional preacicular lamellae are neither described nor figured also in Lana's description (1986:139, figs. 4, 5) of *N. squamosa* from Brazil. Since additional preacicular lamellae, especially suprapreacicular lamellae on notopodia, are difficult to observe in some specimens, the lack of description may not necessarily imply absence in specimens concerned. Nevertheless, it seems to be necessary to reexamine these specimens for certain identification.

Nephtys squamosa is closely related to *N. acrochaeta* Hartman, 1950, *N. imbricata* Grube, 1857 and *N. serratifolia* Ehlers, 1897 in the possession of scale-like dorsal lamellae. *Nephtys squamosa,* however, differs from *N. acrochaeta* in that branchiae are present from setigers 2–3 in the former and 9–10 (Hartman 1950, Fauchald 1976) in the latter. Neuropodial postsetal lamellae are lacinated in *N. acrochaeta* (Hartman 1950) and *N. serratifolia* (Ehlers 1897), whereas they are entire in *N. squamosa.* Capillary setae with a large spur are present in postacicular fascicles both in *N. acrochaeta* (Hartman 1950) and *N. serratifolia* (Hartman-Schröder 1965), but absent in *N. squamosa. Nephtys imbricata* is 'too incompletely known for certain identification' (Hartman 1950:111), but according to the original description (Ehlers 1887), *N. squamosa* differs from *N. imbricata* in parapodial morphology. I have examined types of both species, however further study will be needed to fully characterize *N. imbricata.*

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Literature Cited

Augener, H. 1918. Polychaeta.—Beiträge zur Kenntnis des Meeresfauna West-Afrikas 2:67–625, 6 pls.

Ehlers, E. 1887. Report on the annelids of the dredging expedition of the U.S. coast survey steamer *Blake.*—Memoirs of the Museum of Comparative Zoology of Harvard College 15:vi + 335 pp., 60 pls.

———. 1897. Polychaeten.—Hamburger Magallanische Sammelreise. Hamburg, Friedrichsen & Co. 148 pp., 9 pls.

Fauchald, K. 1972. Benthic polychaetous annelids from deep water off western Mexico and adjacent areas in the eastern Pacific Ocean.—Allan Hancock Monographs in Marine Biology No. 7: 1–575.

———. 1976. Some Nephtyidae (Polychaeta) from Ubatuba, Brasil.—Bulletin of the Southern California Academy of Sciences 75:16–19.

Fauvel, P. 1936. Contribution a la fauna des Annélides polychètes du Moroc.—Mémoires de la Société des Sciences Naturelles du Moroc 43:1–143.

Gardiner, S. L. 1976. Errant polychaete annelids from North Carolina.—Journal of the Elisha Mitchell Scientific Society 91:77–220.

Grube, E. 1857. Annulata Örstediana Enumeratio Annulatorum, quae in itinere per Indiam occidentalem et Americam centralem annis 1845–1848 suscepto legit cl. A. S. Örsted, adjectis speciebus nonnullis a cl. H. Kröyero in itinere ad Americam meridionalem collectis.—Videnskabelige Meddelelser fra Dansk naturhistorisk Forening i Kjøbenhavn 1857:1–29.

Hartman, O. 1940. Polychaetous annelids. Part 2. Chrysopetalidae to Goniadidae.—Allan Hancock Pacific Expeditions 7:173–287.

———. 1950. Polychaetous annelids. Goniadidae, Glyceridae, Nephtyidae.—Allan Hancock Pacific Expeditions 15:1–181.

Hartmann-Schröder, G. 1965. Zur Kenntnis des Sublitorals der chilenischen Küste unter besonderer Berücksichtigung der Polychaeten und Ostracoden. Teil II. Die Polychaeten des Sublitorals.—Mitteilungen aus dem Hamburgischen Zoologischen Museum und Institut 62 (Supplement):59–305.

Lana, P. C. 1986. Nephtyidae (Annelida; Polychaeta) do litoral do estado do Paranã (Brazil).—Neritica 1:135–154.

Monro, C. C. A. 1933. The Polychaeta Errantia collected by Dr. C. Crossland at Colon, in the Panama region, and the Galapagos Islands during the expedition of the S. Y. 'St. George'.—Proceeding of the Zoological Society of London 1933:1–96.

Nonato, E. F., & J. A. C. Luna. 1970. Anelídeos poliquetas do nordeste do Brasil. 1. Poliquetas bentônicos da costa de Alagoas e Sergipe.—Boletim do Instituto Oceanográfico, São Paulo 19:57–130.

Pettibone, M. H. 1963. Marine polychaete worms of the New England Region. 1. Aphroditidae through Trochochaetidae.—United States National Museum Bulletin No. 227:1–356.

Taylor, J. L. 1984. Family Nephtyidae Grube, 1850. Pp. 1–20 *in* J. M. Uebelacker & P. G. Johnson, eds., Taxonomic guide to the polychaetes of the Northern Gulf of Mexico, Vol. 5, Chapt. 35. Barry A. Vittor & Associates, Inc., Mobile, Alabama.

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